



Features Of Morphofunctional Indicators Of Children's Organisms Living In The Conditions Of The Republic Of Karakalpakstan

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ANNOTATION. The article presents the results of studying the features of the functional state of children in the conditions of the Southern Aral Sea region, as well as the indicators of body mass and height of children living in various districts of Karakalpakstan. The growth and development of children remains the main indicator of their health status. Changes in growth processes, the ratio of body weight to the child's height, and growth cessation are the main or even the only manifestation of chronic diseases.

KEYWORDS: Southern Aral Sea region, disharmony, physical development, morphofunctional state, ecological factors, indicator, centile table.

INTRODUCTION

Despite the large number of studies devoted to the problems of investigating children's adaptive systems, many questions remain entirely undiscussed to this day, or have been addressed not comprehensively but only within the narrow boundaries of ontogenesis. In recent years, a great number of works by contemporary researchers have focused on children's physical development; however, results of comprehensive functional studies are rarely presented.

To understand the patterns of a child's growth and development, it is necessary to accumulate and generalize existing and new knowledge and patterns of a child's growth and development in changing environmental conditions, revise and develop regulatory regional indicators of physical development, organize



effective health monitoring, adequate prevention, early diagnosis, and correction of growth and body weight disorders.

Numerous researchers [1; 4] have demonstrated that, alongside genetic factors, ecological factors also exert a significant influence on the development of children's organisms. The scientific significance of research devoted to children's physical development has grown considerably in recent years [2; 3]. According to extensive data, indicators of children's physical development and health status have shown a negative trend over the past two decades [5; 6]. At the same time, it remains essential to obtain timely and accurate data on children's physical development in order to organize preventive measures effectively.

Disharmonic physical development in children has become increasingly common, characterized not only by a reduction in the organism's functional reserves but also by delayed sexual maturation, the development of somatic diseases, and the emergence of trophological syndrome or trophological insufficiency [www.albany.edu/ihe].

The issues of individual variability in growth processes remain insufficiently studied. Nonetheless, studying the physiology of growth is of great importance - particularly in cases of deviation from average height indicators - since growth retardation, and sometimes acceleration, may be the sole sign of a wide range of diseases. Furthermore, body dimensions may not necessarily be reflected in the organism's morphofunctional state. Thus, the subject under discussion is of current relevance to physiology and holds significant importance in medicine, education, physical training, and other areas of human life.

MATERIALS AND METHODS

Based on the territorial zoning of the Republic of Karakalpakstan by degree of ecological damage, it can be observed that the Takhtakupir district is located in the most ecologically vulnerable northern zone, while the Ellikqala district is situated in comparatively favorable ecological conditions in the southern zone. According to place of residence, the examined children were divided into two groups: Group I - children living in the ecologically unfavorable northern districts of the Republic of Karakalpakstan, and Group II - children living in the comparatively favorable ecological conditions of the southern districts.



The research program included the study of morphofunctional indicators of children aged 6-10 years with varying growth rates. The rate of individual development was assessed by comparing the age and sex-specific mean indicators of the examined group with the results of height measurements.

A non-parametric (sigma) method was applied to assess the level of nutrition sufficient for the normal physiological development of children. Using the attached sigma table, the nutritional adequacy of each child (centile level) was determined based on body weight values and their corresponding height values, along with the degree of deviation from normative indicators (50th centile - "average"; 75th centile - "above average" nutrition; 90th centile - "excess" nutrition) [4]. The method is based on numerical ratios between selected anthropometric parameters, as reflected in index calculations - i.e., a priori mathematical formulas.

RESULTS AND DISCUSSION

It is well established that the primary indicators in studying children's physical development are body weight and height growth. These parameters are used for evaluating and interpreting children's health status. The growth and development of children remain the main indicator of their health condition. Changes in growth processes, alterations in the body weight-to-height ratio, and growth cessation are considered the primary or even the sole manifestation of chronic diseases. Furthermore, children's physical development serves as a predictive marker of pathology.

Analysis of the above-mentioned characteristics of height and body weight of boys and girls residing in various districts of the Southern Aral Sea region revealed that the lag in growth and body weight indicators or their position at the lower boundary of the norm suggested a connection to the nutritional status factor. The assessment of nutritional status is of great importance, as it represents a morphofunctional indicator of the organism that responds with high sensitivity to the effects of various environmental factors, including nutritional disturbances. Adequate nutrition is considered one of the primary criteria of a child's health. According to D.K. Sailanova et al. (1998), the indicator of adequate nutrition is normotrophy, that is, the correspondence of body weight to height. Nutritional

disturbances (dystrophy) are indicated by a body mass deficit relative to height (exceeding 10%) and by excess body weight relative to height (obesity).

Using centile tables alongside age indicators, and applying the non-parametric method based on the correspondence between body weight and height of children residing in various districts of the Southern Aral Sea region, the nutritional status assessment yielded the following results (Tables 1, 2).

Table 1.

Assessment of Nutritional Status Using Centile Distribution of the Height-to-Weight Ratio for Children Residing in the Northern Districts (n=130)

Age	Boys			Girls		
	Height, cm	Body weight, kg	Centiles	Height, cm	Body weight, kg	Centiles
6	109.2±0.7	26.3±0.7	97	106.2±0.8	19.0±0.1	97
7	117.2±0.4	28.8±0.3	97	112.1±2.1	21.3±0.4	90
8	123.3±2.1	31.2±0.7	97	121.8±1.6	25.6±0.5	90
9	129.2±1.7	32.5±0.1	90	127.4±1.2	29.7±0.4	97
10	132.3±1.0	33.9±0.8	90	130.6±1.0	33.0±0.3	97

Note: (25–75th centile) – 50th centile = "average" to "above average" nutrition range; 75th centile = "above average" nutrition; 90th centile = "excess" nutrition.

Table 2.

Assessment of Nutritional Status Using Centile Distribution of the Height-to-Weight Ratio for Children Residing in the Southern Districts (n=123)

Age	Boys			Girls		
	Height, cm	Body weight, kg	Centiles	Height, cm	Body weight, kg	Centiles
6	108.5±1.8	21.8±0.7	97	101±0.7	18.2±0.1	75
7	115.8±2.1	24.7±0.3	97	107.0±1.4	20.8±0.4	75
8	123.9±1.6	26.8±0.7	97	111.4±1.1	24.4±0.5	75



Age	Boys			Girls		
	Height, cm	Body weight, kg	Centiles	Height, cm	Body weight, kg	Centiles
9	127.3±1.2	29.1±0.1	97	113.5±1.7	27.5±0.4	90
10	131.8±1.0	31.8±0.8	97	121.8±1.0	30.6±0.3	90

Note: (25–75th centile) – 50th centile = "average" to "above average" nutrition range; 75th centile = "above average" nutrition; 90th centile = "excess" nutrition.

The body weight-to-height ratio in boys residing in the southern districts fell within the 90th–97th centile range, indicating "excess" nutrition. In girls aged 6–8 years living in these districts, the centile distribution of the body weight-to-height ratio was approximately at the 75th centile, indicating "above average" nutrition. In subsequent stages of growth, these values increased to the 90th centile, indicating "excess" nutrition.

Thus, the results of the analysis indicate that, regardless of the children's place of residence, their nutritional status does not influence changes in height and body weight indicators. This, in turn, supports the conclusion that the underlying cause of the observed condition is an ecological factor.

Changes in the growth and development processes of children from various districts of the Southern Aral Sea region do not differ significantly from one another and correspond to below-average normative indicators.

The deviation of age-related indicators from the norm is associated with the early passage through the ontogenetic period, which in turn leads to changes in the aforementioned height and body weight characteristics of children born and residing in various districts of the Southern Aral Sea region.

Furthermore, according to anthropometric data, the annual increase in height also falls within the physiological range. Based on the results obtained, attention should be paid to anthropometric indicators from early childhood, specifically from the age of 6.



LIST OF USED LITERATURE

1. Баевский, Р.М. Основные принципы измерения уровня здоровья // Проблемы адаптации и учение о здоровье. - М.: Изд-во Российского ун-та Дружбы народов, 2006. - С. 119-165.
2. Мамбеткаримов Г.А., Мамбетуллаева С.М. Количественная оценка экзогенных факторов, влияющих на состояние здоровья детского населения в условиях Республики Каракалпакстан // Медицинский журнал Узбекистана. – Ташкент, 2001. - № 1. – С. 99-100.
3. Мираметова Н.П., Данабаева А.Ж. Эколого-физиологические особенности адаптивных реакций организма подростков в условиях Южного Приаралья // Журнал Хорезмской Академии Маъмуна. – 2022.– № 8/1.– С. 82 –86.
4. Сайланова Д.К. Состояние фактического питания и физического развития детей 1-7 лет в условиях Южного Приаралья (Республика Каракалпакстан). - Автореф канд. мед. наук.- Ташкент.- 2004.- 18 с.
5. Duki M.I., Sudannadi S., Suzuki S.et al. Effect of air pollution on respiratory health in Indonesia and its economic cost //Arch. Environ. Health. - 2003. -Vol. 58. -N 3. - P.135-143.
6. Mambetullaeva S.M., Madraimova S. The impact of climate change and desertification processes on groundwater in the northern and southern districts of the republic of Karakalpakstan. International Conference on Medicine & Agriculture, 2025. -80-82 p.